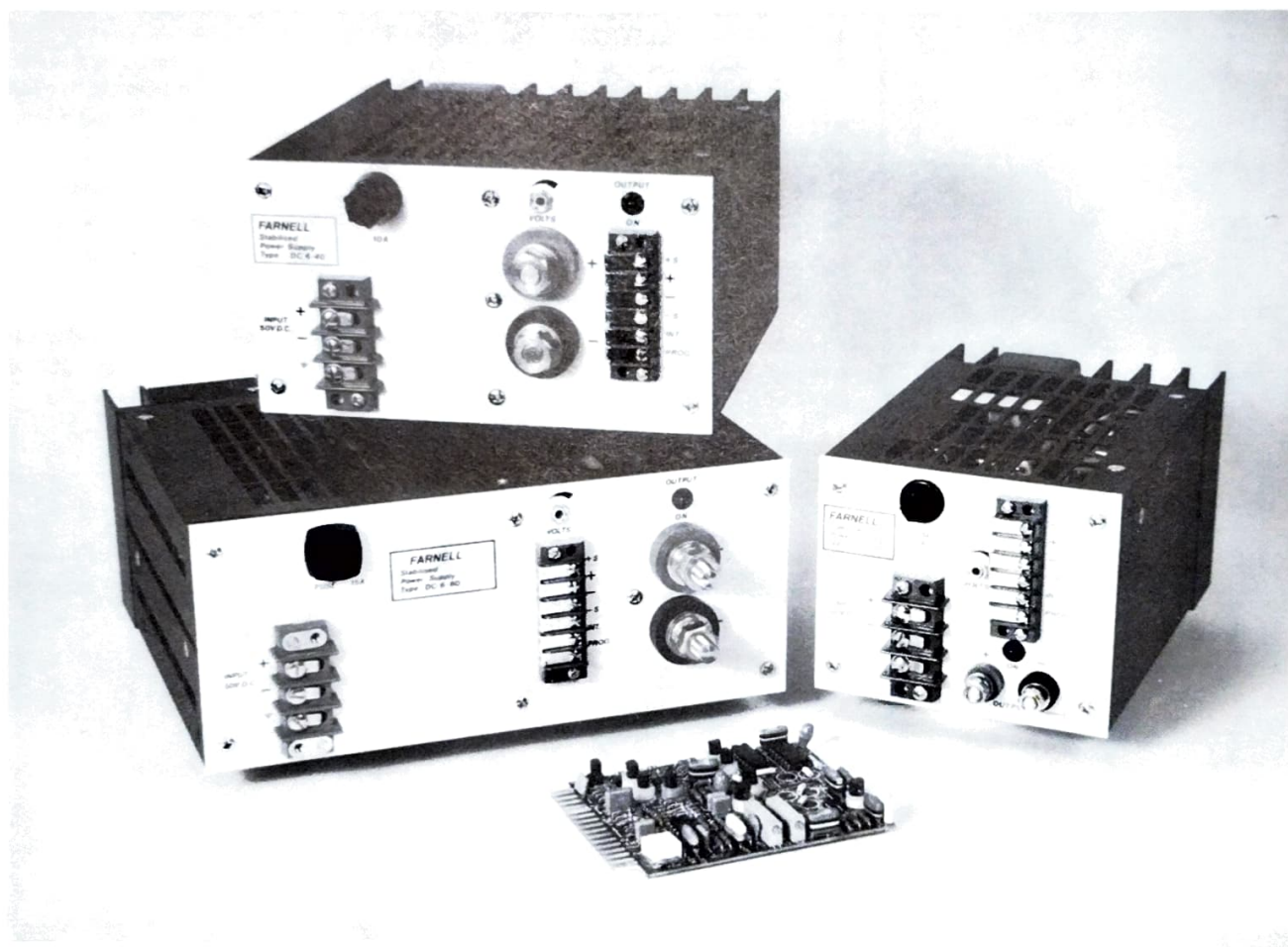




# Farnell

## DC range d.c. — d.c. converters



**Switched-mode technique for compactness and high efficiency**

**Generous d.c. output adjustment range : 4-6V, 8-12.6V or 16-25.2V depending on model. Full current at any setting within that range in ambients up to 55°C**

**All units programmable down to 1V with full current available**

**Soft start circuit holds down in-rush current**

**L.E.D. lamp indicates presence of output**

**Well protected. Constant current limiting. Overvoltage protection. Accessible fuses. Optional overcurrent trip**

**500V input/output insulation. Low r.f.i.**

**Test procedure includes numerous switch-on cycles and elevated temperature test over two weeks for maximum reliability**

**Mechanically compatible with other manufacturer's units. Identical fixing, heat sink position etc.**

The Farnell d.c. range power supplies use a switched-mode technique to provide stabilised d.c. from d.c. inputs. Compared with conventional series regulator units they offer dramatic size and weight reduction and conserve power by operating more efficiently.

The units are in three package sizes of 120, 240 and 360 watts maximum output power. Three versions of each package give 6, 12 or 24 volts nominal at currents appropriate to package VA. Output voltage may be set within the range shown in 'Units available' by a screwdriver adjustment to a potentiometer accessible through a hole in the front panel. Full current is available at any setting within the range of the unit at ambient temperatures of up to 55°C. Alternatively, the output voltage may be programmed by external resistance from nominal to as low as 1 volt without loss of current. Provision is also made for remote sensing of the load to correct for voltage drop in the load connecting leads. Units may be connected directly in series or parallel. An L.E.D. lamp indicates presence of output and where several units are employed in one installation, provides a rapid visual check of the power system.

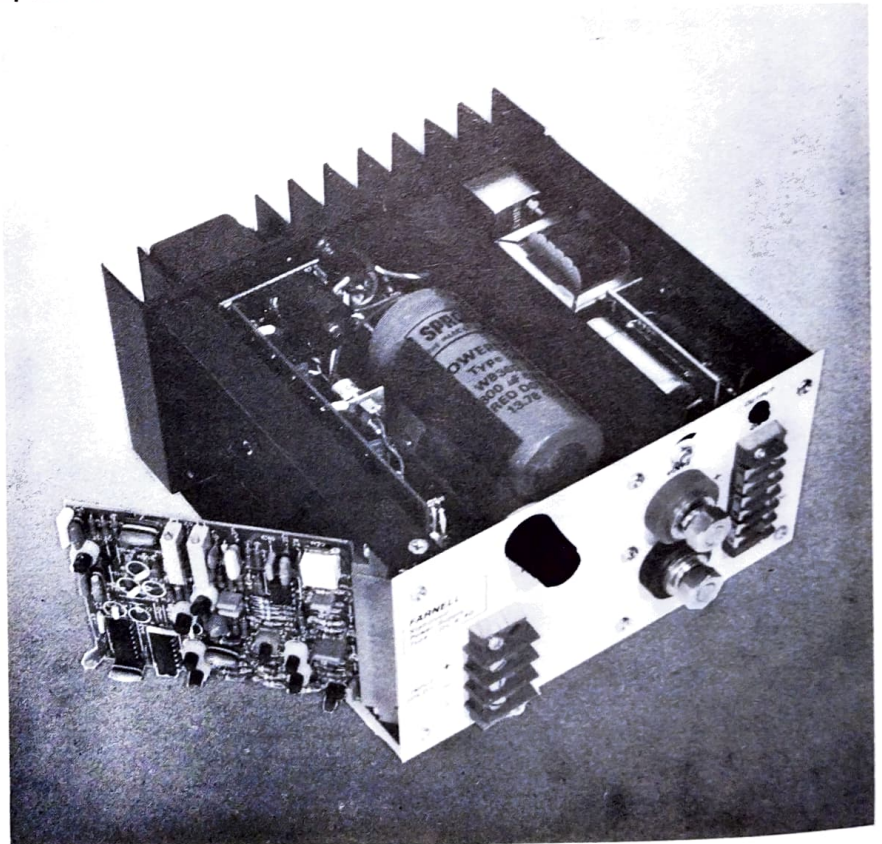
Constant current limiting and overvoltage protection are provided and are factory preset. An overcurrent trip (option C) is available to disable the output after approximately 200ms of overcurrent. This provides greater protection for the external load in the event of short current overload. This provides greater protection for the external load in the event of short circuits on power carrying tracks on P.C. boards for example. The standard current limit circuit resets itself automatically when the load returns to normal. The optional current trip, like the overvoltage protection, is reset by momentarily interrupting the d.c. input to the power unit. A fuse is fitted on the d.c. input and is readily accessible on the front panel.

Switch on (inrush) current has been minimised by the use of a 'soft-start' circuit. This ensures that the peak value of input current at switch-on is limited to the value given in the specification.

Quantities of units with alternative input voltages, output voltages and facilities can be manufactured to special order.

*Triple output units in 240W package are described in a separate publication. These are DCT6-20 providing 4.75-6V, 20A and 2 x 14.5-15.5V, 1.75A and DCT6-20 B providing 4.75-6V, 20A and 2 x 11.5-12.5V, 1.75A.*

#### Open view



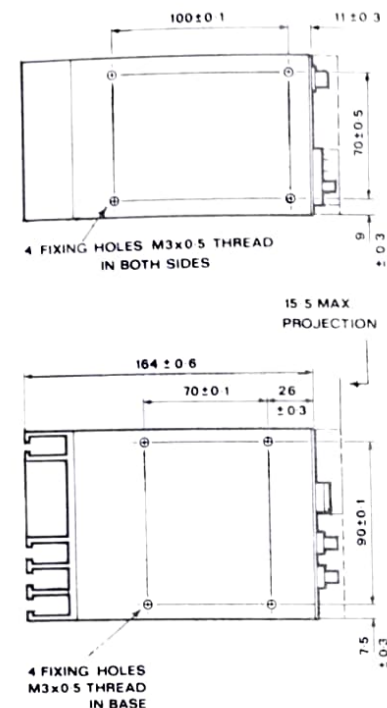
#### Rack mounting

Units fit the aperture of the VERO KM4 Card Frame system (or similar) which conforms to DIN41494 standard for Eurocards small (100 x 160mm) and large (233.4 x 160mm).

Mounting metalwork is normally available from the card manufacturers.

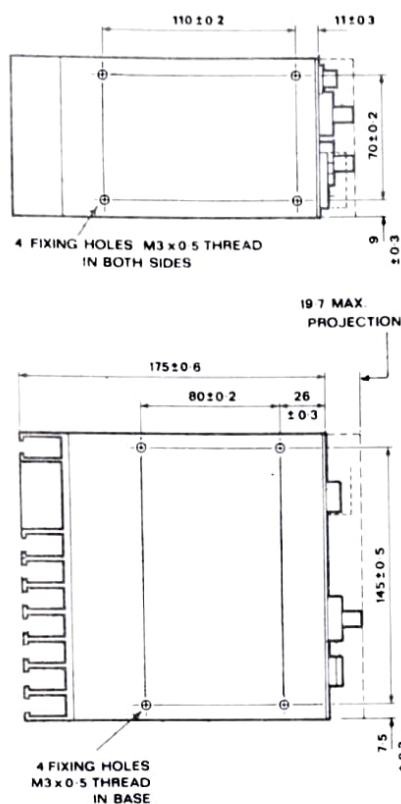


## Mechanical details: 120 watt package



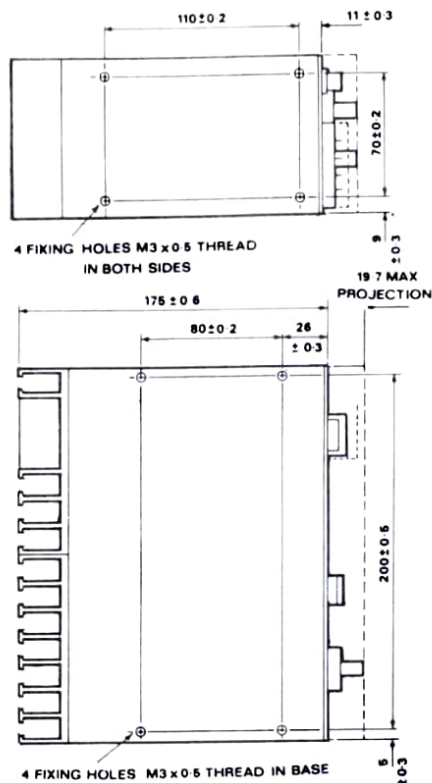
Weight 2kg

## 240 watt package



Weight 3kg

## 360 watt package



Weight 3.75kg

### Units available

Model	Max. output d.c.	Output voltage adjustment range	Package
DC6-20	6V, 20A	4-6V	120W
DC6-40	6V, 40A	4-6V	240W
DC6-60	6V, 60A	4-6V	360W
DC12-10	12.6V, 10A	8-12.6V	120W
DC12-20 *	12.6V, 20A	8-12.6V	240W
DC12-30 *	12.6V, 30A	8-12.6V	360W
DC24-5	25.2V, 5A	16-25.2V	120W
DC24-10	25.2V, 10A	16-25.2V	240W
DC24-15 *	25.2V, 15A	16-25.2V	360W

\* Special Order

## General specification

**Nominal input** 50V d.c.      **Variation tolerated**  $\pm 16\%$       **Output** See 'Units available'

**Output regulation** 0.1% maximum variation for a worst case combination of 0-100% load change and  $-16\%$  to  $+16\%$  nominal line change

**Ripple and noise** at full load (30MHz bandwidth). Less than 10mV r.m.s.; 80mV pk-pk

**Temperature coefficient**  $\pm 0.01\%$  per  $^{\circ}\text{C}$  typical

**Output impedance** 100m  $\Omega$  at 100kHz and  $25^{\circ}\text{C}$  typical

**Transient recovery time** Typically 1mS for output to recover within 50mV following a 10-100% or 100-10% load change of 5 $\mu\text{S}$  risetime. Typical instantaneous output deviation 350mV

**Operating ambient temperature range**  $0^{\circ}\text{C}$  to  $55^{\circ}\text{C}$  for full output current

**Maximum operating ambient temperature**  $70^{\circ}\text{C}$ . Output current derates linearly from full load at  $55^{\circ}\text{C}$  to half load at  $70^{\circ}\text{C}$

**Storage temperature range**  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

**Hold-up time** Output maintained for typically 5mS at maximum output current and 50V nominal input with the unit operating at maximum output voltage

**Switch-on surge** Limited by soft start facility to 3 times full load current

**Switch-on time** Output established within 600mS typically

**Insulation** Tested at 500V peak for one minute between d.c. input and d.c. output, with output terminals and earth connected together.  $\pm 250\text{V}$  d.c. continuous rating between output and earth. Tested to 500V d.c. for one minute

**Remote voltage control** Programming resistance 1000 $\Omega$ /V  $\pm 0.5\%$   
Range: 1V to unit max. output voltage

**External sensing limitation** Unit output terminal voltage must not exceed 6V for nominal 6V units, 12.6V for nominal 12V units and 25.2V for nominal 24V units, i.e. load voltage + total lead voltage < max. range voltage

**Efficiency** Better than 70%. Typically 77% at full load

**Protection** *Overload* Constant current limiting set at  $110\% \pm 5\%$  of full load.  
Option C. As above plus output disabled after approx. 200mS of overload

*Overvoltage* Set at nominal output voltage  $+20\%$ . Disables control circuit and output falls to zero. See options.

*Fuse* The d.c. input circuit is fused

**Series and parallel operation** No limit on parallel operation  
Series operation to a max. total output voltage of 250V

**Remote on/off** Output is reduced to zero by short-circuiting the 'PROG' and '+S' terminals

**Options** Suffix C overcurrent trip. For overvoltage at 6V instead of  $+20\%$  add on suffix D (on 6V units)

Represented by:

Manufactured in England by:



FARNELL INSTRUMENTS LIMITED  
SANDBECK WAY · WETHERBY  
WEST YORKSHIRE LS22 4DH  
TELEPHONE 0937-63541 · TELEX 557294

LONDON OFFICE:  
TELEPHONE 01-864 7433 & 7434

INSTRUCTION BOOK FOR

**DCT6 - 20**  
POWER SUPPLY

PRICE £2.00

ISSUE 1 8 79

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## SCHEDULE OF EQUIPMENT

The unit has been carefully packed to prevent damage in transit. When removing the unit from the box ensure that all parts and accessories are removed from the packing material.

The complete equipment comprises:-

- a) 1 off DCT6-20 power supply
- b) 1 off instruction book
- c) 1 off packet of accessories comprising:-
  - 1 off spare fuse
  - 2 off output terminal nuts
  - 4 off washers flat
  - 4 off washers spring
  - 17 off terminal tags
  - 4 off fixing screws 8mm long (see note in paragraph 'Mounting and ventilation on page 9)

Note:- In the event of damage in transit or shortage in delivery, separate notices in writing should be given to both the carriers and Farnell Instruments Ltd., within three days of receipt of the goods, followed by a complete claim within five days. All goods which are the subject of any claim for damage in transit or shortage in delivery should be preserved intact as delivered, for a period of seven days after making the claim, pending inspection or instructions from Farnell Instruments Ltd., or an agent of this Company.



## INTRODUCTION

The Farnell DCT6-20 power supply uses a combination of switching and linear control techniques to provide three independent stabilized d.c. outputs from a d.c. input.

The unit has one main output which can deliver a maximum of 6V 20A and two completely separate auxiliary outputs, each of which can be set to a nominal 12V or 15V output and can deliver up to 2A.

The output voltages may be varied separately by screwdriver adjustment of front panel potentiometers. The adjustment range of the main output is 4.75V to 6V. Each auxiliary output can be adjusted over the range 11.5 to 15.5V but the unit is only specified for operation at 12V  $\pm 0.5$ V or 15V  $\pm 0.5$ V. Selection of 12V or 15V nominal output is by separate internal tap links for each auxiliary output.

Units are normally supplied from the factory with the auxiliary output tap links set to 15V but, on request, units can be supplied with both tap links set to 12V. This unit is identified by the suffix 'B' after the model number (i.e. DCT6-20B).

Provision is made on each output for remote sensing of voltage at the load to correct for voltage drop in the load connecting leads.

All the outputs may be switched on or off together by remote control and a front panel L.E.D. is provided for each output to indicate the presence of output voltage.

Current limiting is provided on each output and an optional overcurrent trip is available which disables all the outputs after approximately 200mS of current overload on the main output.

Overvoltage protection is provided which disables all outputs if excess voltage appears on the main output. A 'soft-start' circuit is employed which limits the peak value of input current at switch on.

Unit outputs may be connected in series with other outputs of similar rating and parallel operation of the auxiliary outputs is permissible.

Model	Nominal output volts d.c.	Voltage adjustment range	Rated output current
GT6-20A	6 and 2 x 15V	4.75 - 6V 14.5 - 15.5V	20A 2A
GT6-20AB	6 and 2 x 12V	4.75 - 6V 11.5 - 12.5V	20A 2A

Option C: Units with optional overcurrent trip can be identified by the presence of suffix 'C' in the model number

## SPECIFICATION

INPUT	50V d.c. $\pm 16\%$
OUTPUTS	<i>Main output</i> 6V at 20A. Voltage adjustable 4.75 to 6V by front panel potentiometer  <i>Auxiliary outputs</i> 2 x 15V at 2A (DCT6-20) OR 2 x 12V at 2A (DCT6-20B) 12 or 15V rails selected by internal tap changes. Voltage adjustable $\pm 0.5V$ from nominal by front panel potentiometer
OUTPUT REGULATION	<i>Main output:</i> 0.1% maximum variation <i>Auxiliaries:</i> 0.01% maximum variation Defined for a worst case combination of 0-100% load change on all outputs and $\pm 10\%$ line change
RIPPLE AND NOISE at full load (30MHz bandwidth)	<i>Main output:</i> Less than 10mV r.m.s.; 80mV pk-pk <i>Auxiliaries:</i> Less than 3mV r.m.s.; 50mV pk-pk
TEMPERATURE COEFFICIENT	<i>All outputs:</i> $\pm 0.01\%$ per $^{\circ}C$ typical
OUTPUT IMPEDANCE	<i>Main output:</i> $100m\Omega$ at 100kHz and $25^{\circ}C$ typical <i>Auxiliaries:</i> $250m\Omega$ at 100kHz and $25^{\circ}C$ typical
TRANSIENT RECOVERY TIME	<i>Main output:</i> typically 1mS for output to recover within 50mV following a 10-100% or 100-10% load change of 5 $\mu$ S rise time. Typical instantaneous deviation 350mV <i>Auxiliaries:</i> typically 100 $\mu$ S for output to recover within 10mV following a 10-100% or 100-10% load change of 1 $\mu$ S rise time
OPERATING AMBIENT TEMPERATURE RANGE	$0^{\circ}C$ to $50^{\circ}C$ for full output current
STORAGE TEMPERATURE RANGE	$-40^{\circ}C$ to $+85^{\circ}C$
SWITCH-ON SURGE	Limited by soft-start circuit to 3 times full load input current
SWITCH-ON TIME	Outputs established within 600mS
INSULATION	Tested at 500V peak for 1 minute between d.c. input and d.c. output with all output terminals and case connected together. $\pm 250V$ d.c. continuous rating between any two d.c. outputs and between each d.c. output and case. Tested to 500V d.c. for 1 minute

REMOTE SENSING	All outputs can be connected for remote voltage sensing. For the main output the load voltage plus total lead drop should not exceed 6V. For each auxiliary output, the total lead drop should not exceed 0.5V
EFFICIENCY	Better than 60%. Typically 65% at full load on all outputs
PROTECTION	<p><i>OVERLOAD</i></p> <p><i>Main output:</i> Constant current limiting set at <math>110 \pm 5\%</math> of full load current. In addition, on units with option C, all outputs are disabled after 200mS of overload on the main output</p> <p><i>Auxiliaries:</i> Cutback current limiting set to <math>110 \pm 5\%</math> of full load current, reducing to approximately 60% of full load current for a short circuit load. Also an auto-reset thermostat protects the unit against prolonged short circuit on the auxiliary outputs. All outputs reduce to zero when the thermostat operates</p> <p><i>OVERVOLTAGE</i></p> <p>On all outputs. Set at maximum output voltage +20%. Disables control circuit and all outputs fall to zero.</p> <p><i>FUSE</i></p> <p>The d.c. input circuit is fused</p>
REMOTE ON/OFF	All outputs are reduced to zero by short circuiting the 'PROG' and '+S' terminals
SERIES AND PARALLEL OPERATION	<p>Main outputs of units should not be connected in parallel. Any number of auxiliary outputs may be connected in parallel.</p> <p>The main output can be connected in series with the outputs of units with similar current rating up to a total output voltage of 250V. Auxiliary outputs can be connected in series with each other or similar outputs up to a total output voltage of 250V</p>
Dimensions (excluding terminals)	
Height 127mm, Width 160mm, Depth 173mm, Weight 3kg	

## OPERATING INSTRUCTIONS

### DC input

The d.c. input terminals are located on the three way terminal block at the left hand side of the front panel, and are marked + (positive), - (negative) and  $\pm$  (earth)

### Output connections

The main output is taken from the large studs on the front panel marked OUTPUT '+' and '-'. Both auxiliary outputs are taken from the 8-way terminal block on the front panel from the terminals marked OUTPUT 1 '+' and '-' and OUTPUT 2 '+' and '-'. For each auxiliary output there are two metal links on the terminal block which link the '+' and +S terminals and the '-' and -S terminals. These should not be removed unless the output voltage is to be remotely sensed.

A front panel L.E.D. is provided for each output to indicate the presence of output voltage.

### Remote sensing

#### *Main output*

The remote sensing terminals for the main output are situated on the 6-way terminal block on the front panel. As supplied the sense terminals for the main output marked '+S' and '-S' are connected to terminals marked '+' and '-' by metal links (The '+' and '-' terminals are connected internally to the main output studs but on no account should load current be drawn from them). For remote sensing applications both metal links are removed and the '+S' and '-S' terminals are connected to the remote load, observing correct polarity. The total voltage drop in the output connecting leads plus the load voltage should not exceed 6V.

Note: The metal link between the 'PROG' and 'INT' terminals should not be removed.

#### *Auxiliary output*

For remote sensing of the auxiliary outputs remove the metal links between the '+' and '+S' and the '-' and '-S' terminals and connect the '+S' and '-S' terminals to the remote load, observing polarity. The total voltage drop in the output connecting leads plus the load voltage should not exceed 15.5V on the 15V auxiliary tap or 12.5V on the 12V auxiliary tap.

### Remote on/off

All the outputs may be reduced to zero by short-circuiting the 'PROG' and '+S' terminals on the 6-way terminal block.

### Series and parallel operation

The main output of the unit may not be connected in parallel with another output. Any number of auxiliary outputs may be connected directly in parallel with each other or with outputs of the same voltage rating.

Any output can be connected in series with other outputs of similar current rating up to a total output voltage of 250V.



## Mounting and ventilation

The units are provided with M3 threaded fixing holes in the base and on both sides. N.B. Fixing screws should not penetrate more than 6mm into the unit. 8mm long fixing screws are supplied.

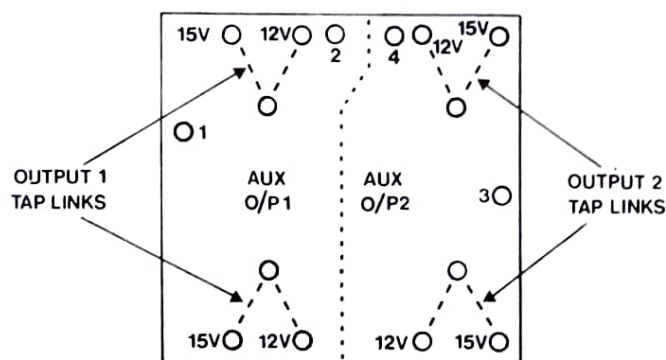
Cooling is by natural convection and provision should be made to allow free air flow into the bottom and out of the top of the unit, particularly in the area of the main heatsink. If the unit is to be mounted on a flat plate, ventilation holes, corresponding to the unit mesh cover holes and the heatsink plan area, should be punched in the plate, or the unit raised off the plate by at least 25mm.

Units may be operated, if necessary, in an inverted position without derating.

## Auxiliary outputs tap changing

Units are supplied from the factory with both auxiliary output taps set to 15V (or for the DCT6-20B, set to 12V). If it is required to change the tap setting on either of the auxiliary outputs the following procedure should be followed.

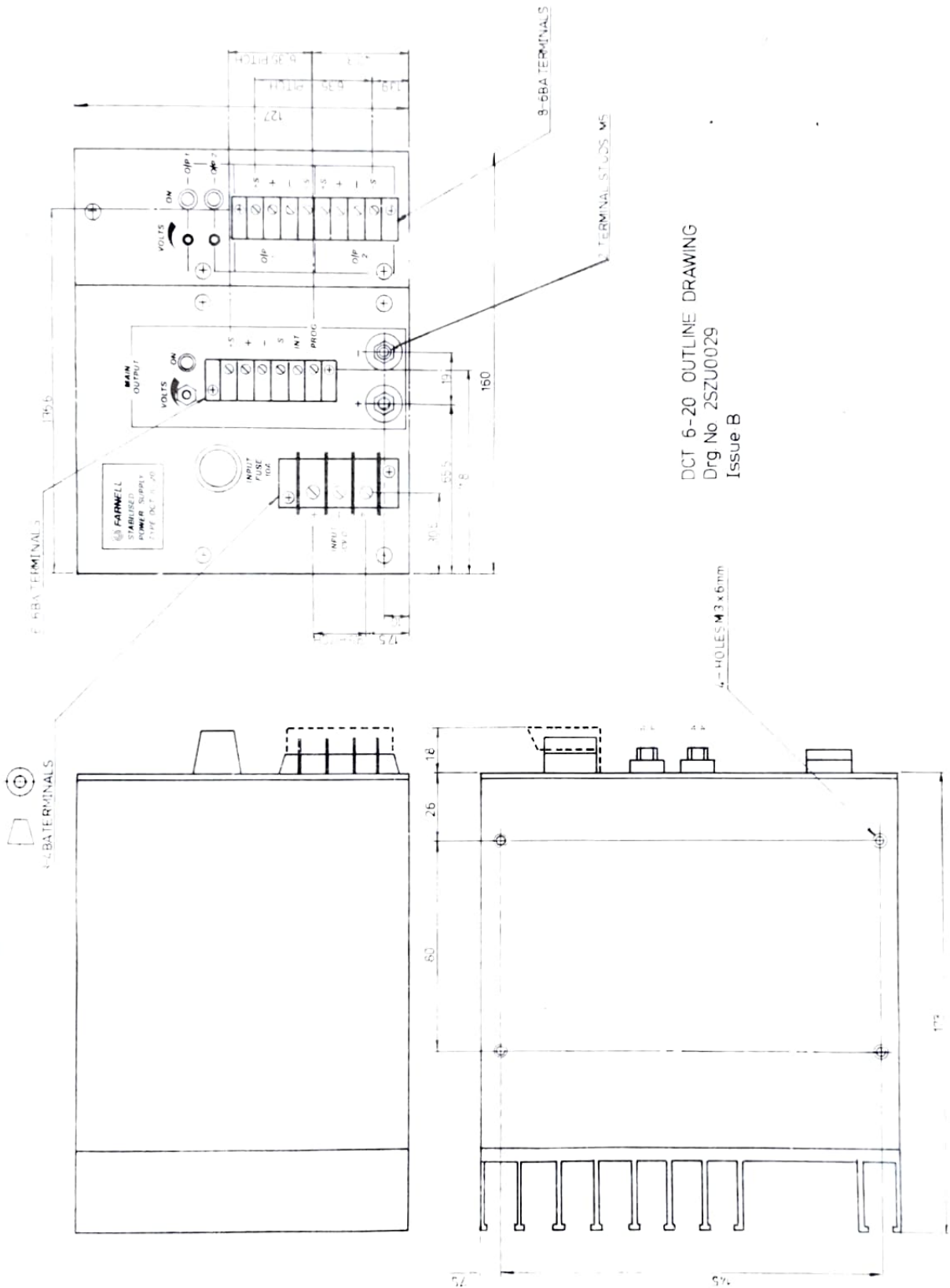
Remove the unit cover to give access to the inverter transformer which is visible from the top of the unit. The inverter transformer is the large ferrite-cored transformer mounted in the right-hand side panel with a small circuit board mounted on it which carries the tap change links as show below.



To change the output voltage tap for a particular output, remove the two links associated with that output and replace them in the indicated 12 or 15V positions as required.

Refit the cover, connect power to the unit and adjust the front panel mounted auxiliary output voltage setting potentiometer to the required voltage which for full output current, should be within 0.5V of the selected 12 or 15V tap.

## MECHANICAL DETAILS



DCT 6-20 OUTLINE DRAWING  
Drg.No. 2SZU0029  
Issue B

## MAINTENANCE

### Guarantee

The equipment supplied by Farnell Instruments Ltd. is guaranteed against defective material and faulty manufacture for a period of twelve months from the date of despatch. In the case of material or components employed in the equipment but not manufactured by us, we allow the customer the period of any guarantee extended to us.

The equipment has been carefully inspected and submitted to comprehensive tests at the factory prior to despatch. If, within the guarantee period, any defect is discovered in the equipment in respect of material or workmanship and reasonably within our control, we undertake to make good the defect at our own expense subject to our standard conditions of sale. In exceptional circumstances and at the discretion of the Service Manager, a charge for labour and carriage costs incurred may be made.

Our responsibility is in all cases limited to the cost of making good the defect in the equipment itself. The guarantee does not extend to third parties, nor does it apply to defects caused by abnormal conditions of working, accident, misuse, neglect or wear and tear.

### Maintenance

In the event of difficulty, or apparent circuit malfunction, it is advisable to telephone (or telex) the Service Department or your local Sales Engineer or Agent (if overseas) for advice before attempting repairs.

For repairs it is recommended that the complete unit be returned to:-

The Service Department  
Farnell Instruments Ltd.  
Sandbeck Way  
Wetherby, Yorkshire  
LS22 4DH.  
Tel: 0937 63541 Telex: 557294

Please ensure adequate care is taken with packing and arrange insurance cover against transit damage or loss.

Warning! - Hazardous voltages (see page 8)

If repairs are to be attempted by the customer these should be undertaken only by personnel conversant with this type of equipment.

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DRAWING No		
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SHEET	1	OF 1 SHEETS